Page 12, line 1, change "travel" to --stroke--;
line 3, change "travel" to --stroke--.

Page 13, line 3, change "travel" to --stroke-- (all instances);
line 15, change "travel" to --stroke--;
line 16, change "travel" to --stroke--.

IN THE ABSTRACT:

Line 9, change "direction of travel" to --stroke direction--;
line 11, change "direction of travel" to --stroke direction--.

REMARKS

Reconsideration of the application is respectfully requested.

The specification has been amended to change "travel" to --stroke-- where appropriate. Although the German term "hub" was originally translated as "travel," which does describe the movement or displacements in question, it appears that "stroke" is a more accurate translation of the German original even though the terms are essentially synonymous in this context. It is therefore respectfully submitted that no new matter has been introduced by the change.

The rejection under 35 USC 112 has been addressed by incorporating the suggestions made by the Examiner, and by defining the reversing and side position more specifically in terms of the displacement of the spool. It is respectfully submitted that each of the grounds for rejection under 35 USC 112, second paragraph, has been addressed, and that the claims are now in compliance with 35 USC 112, second paragraph.

The rejection of claims 1-7 under 35 USC 103 as being unpatentable over U.S. Patent No. 2,724,563 (Shakespeare) in view of Japanese Patent Publication 49-6497 (Hitachi) is respectfully traversed, especially with respect to independent

claim 2, which includes all of the limitations of original claims 1 and 2, except that "approximately 90°" has been changed to --a non zero--.

The Examiner is correct that Shakespeare only discloses a "C"-shaped guide slot. However, applicant respectfully traverses the conclusions of the Examiner on page 3 of the Official Action that Shakespeare prevents uneven winding of the line on the spool and that the S-shape is essentially equivalent. As discussed in the "Description of Related Art, the C-shape is not as effective as the S-shape at preventing bulges. Furthermore, even if the C-shape were as effective, it is respectfully submitted that Hitachi does not provide motivation for converting the C-shape to an S-shape, and in fact those skilled in the art would have been led by the description in Shakespeare not to vary the C-shape, because there would be no motivation to modify a device which worked perfectly well (see column 2, lines 63 et seq. of Shakespeare).

The use of a variety of different guide slot designs, including curved guide slot designs, is well known and examples are described in applicants' own specification in the section entitled "Description of Related Art." This does not make the claimed design obvious, however, absent teachings in the prior art to suggest the change.

That the Hitachi reference does not suggest modification of the C-shaped slot of Shakespeare to have an S-shape is apparent from the English language translation of Hitachi which is attached as Exhibit I. In addition to lacking any teaching which would lead one to use the S-shaped slot shown therein in the specific structure of Shakespeare et al., the following differences are noted, all of which would make it even less likely for one of ordinary skill in the art to use the Hitachi reference to modify Shakespeare's fishing reel:

a) The Hitachi reference describes a device used in a completely different and non-analogous field than the present invention, namely a thread guide for a textile machine. It is respectfully submitted that one of ordinary skill in the art of

fishing reels would not look to the weaving art, which involves complex thread patterns, for solutions to a problem involving smooth casting and reeling in of a simple fishing line (the Examiner will note that textile wefts and warps are not reeled in during weaving).

b) The object of the device disclosed in the Hitachi reference is to achieve an even speed of the gear 11 and member 13 (see page 3, at the end of the second paragraph, of the translation). Achieving such an even speed of a guide part 13 has nothing to do with either the claimed invention or the fishing reel of Shakespeare. In the claimed combination, the claimed cam stud undergoes a changing speed in order to produce an ideal winding. Hitachi simply does not address the problem of achieving a level winding without bulges. Instead, the goal of Hitachi is apparently to permit the guide to drag, thus permitting the textile machine to have special effects. While this is of concern in the weaving art, it has nothing to do with the fishing reel art.

c) Structurally, Hitachi's device is also nonanalogous, because it uses a planetary gear mechanism rather than an eccentric gear. Figures 1 and 2 of Hitachi show a far more complicated arrangement than that of Shakespeare or the present invention, in which a rotating arm 10 is provided adjacent guide 15 to achieve a very complicated movement which cannot be compared with the "to and fro" stroke of a fishing reel. In particular, it should be noted that the guide groove 15 is in a stationery part, which is fixed to attachment plate 16. In contrast, in the claimed invention and in Shakespeare, the cam stud or eccentric is fixed on the spindle to move the guide groove in order to obtain the stroke movement of the spindle.

Thus, in summary Shakespeare does not disclose a fishing reel having an elongated S-shape, sidewalls of the S forming means for causing the speed to increase at the reversing positions and decrease at the side positions in a continuously changing manner as claimed. Furthermore, Hitachi does not suggest modification of Shakespeare's C-shaped guide groove to accomplish this object

because Hitachi discloses 1) a textile weaving machine, which is 2) designed to achieve an even speed of the gear 11 to control complex weaving patterns as opposed to achieving an even winding, and 3) which uses a stationary guide part.

It is respectfully submitted that it is unreasonable to conclude that one of ordinary skill in the art, presented with Shakespeare's allegedly evenly winding fishing reel, would look to a textile machine which has an entirely different structure for a solution to problems which Shakespeare does not even recognize. While Hitachi does disclose an S-shape, this is for totally non-analogous reasons and there is absolutely no reason why one would apply such an S-shape, which is in a stationery guide part, to replace the C-shape of the moveable guide part in the Shakespeare reel.

For the foregoing reasons, it is respectfully submitted that each of the claims is now in condition for allowance and expedited passage of the application to issue is requested.

Respectfully Submitted,

Benj E Urcia

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APPENDIX A

2. (Amended) [An improvement as claimed in claim 1,] In a fishing reel which includes a spool for receiving a fishing line, a cam drive, and a spindle member, the spool having a longitudinal axis and being displaced to and fro parallely to the longitudinal axis between reversing positions at which a direction of displacement of the spool reverses by means [of a] the cam drive which actuates [a] the spindle member connected to the spool, the cam drive including a guide part having a guide slot, said guide part being connected to the spindle member, and a gear rotated by a crank drive of the fishing reel, said gear comprising a cam stud and means for eccentrically mounting the cam stud to rotate in a circular path about an axis of rotation, said stud entering the guide slot and sliding along sidewalls of the slot to displace said guide part and therefore the spool in the direction parallel to the longitudinal axis, the improvement wherein the guide slot has an elongated S shape, said cam drive forming drive means for causing the cam stud [being] to be approximately midway [in the S] between end zones of the S when the spool is at the reversing positions and in one of the end zones of the S when the spool is at [the] side positions approximately midway between said reversing positions [(A,C)], wherein [the longitudinal direction] a line connecting said end zones of the S subtends [an approximately 90°] a nonzero angle with respect to the [travel] direction of displacement of the guide part, and wherein during a transition from one reversing position to a next side position, and from the next side position to a next reversing position, said drive means causes said cam stud to impart to the guide part [is imparted] continuously changing [travel] stroke speeds as a result of the shape of the guide slot and displacement of the cam stud, said sidewalls also forming means for causing the speed to increase at the reversing positions and decreasing at the side positions.

3. (Amended) An improvement as claimed in claim 2, wherein segments of the sidewalls in which the cam stud is located before reversal of the spool [travel]

displacement direction are [offset to a greater degree in the direction of travel] spaced farther from a center line whose direction coincides with the direction of displacement of the guide part and which is transverse to said longitudinal direction than are segments of the sidewalls in which the cam stud is located substantially at [or near] the side positions.

4. (Amended) An improvement as claimed in claim 2, wherein a shape and a position of the elongated S relative to the [travel] direction of displacement of the guide part are such that the sidewalls of the guide slot are [shifted] at an oblique angle in midway zones thereof [in] relative to a canter line whose direction coincides with a [the] direction of [travel, with the result] displacement of the guide part and which is transverse to said longitudinal direction such that [each time an enlargement results in] as the cam stud passes said midway zones, [the travel implemented by rotation of the cam stud] a speed of displacement of the guide part is increased.

6. (Amended) An improvement as claimed in claim 2, wherein [there is a lack of geometric congruence between] arcuate zones of the guide slot and the circular path of the cam stud are incongruent.

4 ~~1~~. (Amended) An improvement as claimed in claim ~~2~~ 1, wherein near the two side positions, an angle of the sidewalls relative to the [travel] direction of displacement of the guide part is approximately 40-45°, and an angle of the sidewalls near the reversing positions in the direction of [travel] of displacement of the guide part is approximately 70-75°, slopes of the sidewalls relative to the travel direction changing continuously, without abrupt transitions from one position to the next.

5 ~~8~~. (New) An improvement as claimed in claim ~~2~~ 1, wherein said nonzero angle is an approximately 90° angle.

c:\document\miscltrs\801.amd

Patent Publication Sho-49-6497 of Feb. 14, 1974
(= Pat. Appln. Sho-45-68651 of Aug. 7, 1970)

Title of the Invention:

Traverse Device

Brief Explanation of the Drawings:

Fig. 1 is a longitudinal sectional view of an embodiment according to the invention;

Fig. 2 is a plan view of the device in Fig. 1;

Fig. 3 is a graph showing a velocity curve of a thread guide and;

Fig. 4 is a view for explaining the profile of a corrected cam groove.

Detailed Explanation of the Invention:

This invention relates mainly to a thread traverse device in a thread winding machine for textile machinery.

Recently, along with the progress and development of the textile art, there is a tendency to require the increased winding speed of threads more and more. This also requires that the reciprocating motion of the traverse device be carried out at a higher speed. In order to meet such a requirement, there are proposed an improved device of the conventional barrel type, and another device of the type in which a pair of endless belts running in directions opposite to each other are provided parallel to the traverse direction of the threads and a thread guide is moved in a traverse motion by operating pieces attached to the endless belts. However, these devices have

merits and demerits and it is difficult for them to realize a desired higher winding speed.

This invention makes it possible to realize a desired higher winding speed by a simple mechanism using a planetary gear mechanism.

Now, the present invention will be explained through the embodiment shown in the drawings. 1 indicates a stationary sun gear secured to a base frame 2, and 3 a shaft of revolution concentric with the gear 1, which is revolved through a pulley 4 fixed to the shaft 3. 5 indicates a plate of revolution fixed to the shaft of revolution 3, 6 a pin secured to the plate of revolution 5, 7 an idle gear rotatably mounted on the pin 6 and engaging with the stationary sun gear 1, 8 a planetary gear fixed to a shaft of rotation 9 pivotally supported by the plate of revolution 5, this planetary gear 8 being revolved about the stationary sun gear 1 through the idle gear 7, while rotating about its own axis.

10 indicates a rotating arm secured to the shaft of rotation 9, 11 a cam shaft pivotally supported by the rotating arm 10, 12 a cam arm secured to the cam shaft 11, and 13 and 14 a thread guide and a cam roller mounted on the cam arm 12, respectively. 15 indicates a corrected cam groove provided in a guide plate 16, and the cam roller 14 is loosely fitted in the cam groove 15.

The gear ratio of the stationary sun gear 1 and the planetary gear 8 is selected as 2:1, and the interval between

the shaft of revolution 3 and the shaft of rotation 9 is constituted in such a way as to be equal to the interval between the shaft of rotation 9 and the cam shaft 11, respectively.

Now, consider the case where there is neither a corrected cam groove 15 nor cam roller 14 which is moved along the cam groove 15. When revolving the shaft of revolution 3 through a pulley 4 at a high speed, the cam shaft 11 moves in reciprocating motion on a straight line through the plate of revolution 5, idle gear 7, planetary gear 8 and a rotating arm 10. Since the speed of motion of the cam shaft 11, that is, of the thread guide 13, is expressed by a sine wave like the curve 17 shown in Fig. 3, and therefore, by a non-uniform speed, the thread can not be satisfactorily taken up around a bobbin. Accordingly, it is necessary to correct the above-mentioned sine wave curve 17, making it into the straight line 18 as shown in Fig. 3, so that the cam shaft, i.e. the thread guide 13, moves in an uniform reciprocating motion.

Fig. 3 shows the peak and the trough of the sine wave curve with the time "t" as the ordinate axis and the distance "s" as the abscissa axis.

In order to convert the reciprocating motion at a non-uniform speed of the above-mentioned thread guide into that at an uniform speed, the present invention proposes that the cam roller 14 be mounted on the cam arm 12 secured to the cam shaft 11, as described above, and be adapted to be moved along the corrected cam groove 15 provided in the guide plate 16.

Fig. 4 is a view for explaining the profile of the corrected cam groove 15, in which marks A, B and C indicate the center positions of the thread guide, cam shaft and cam roller, respectively, and the respective positions of the cam shaft, i.e. B, B_1, B_2, B_3. B_4 correspond to the respective positions b, b_1, b_2, b_3, b_4 in Fig. 3. A curve formed by connecting the center positions C_1, C_2. C_3, C_4 of the cam roller corresponding to the aribitrary positions B, B_1, B_2, B_3. B_4 of the cam shaft provides the profile of the corrected cam groove. Accordingly, when the cam roller is moved along the corrected cam groove, the sine wave curve 17 is corrected into the straight line 18. Namely, the cam shaft moves in a reciprocating motion at an uniform speed on a straight line, and along with this motion, the thread guide also moves in a reciprocating motion at an uniform speed.

As described above, all that is done in the present invention is the mere conversion of the reciprocating motion at a non-uniform speed (a sine wave curve) into that at an uniform speed (a straight line). Accordingly, the traverse device according to the invention is not only considerably simple in construction, but also permits the operation at a higher speed, thus increasing the efficiency of the thread winding machine, as compared with the conventional devices, one having a mechanism for converting a rotating motion into a reciprocating motion and the other having a pair of endless belts.

Furthermore, various kinds of reciprocating motions can be

obtained by suitably selecting the profile of the corrected cam groove.

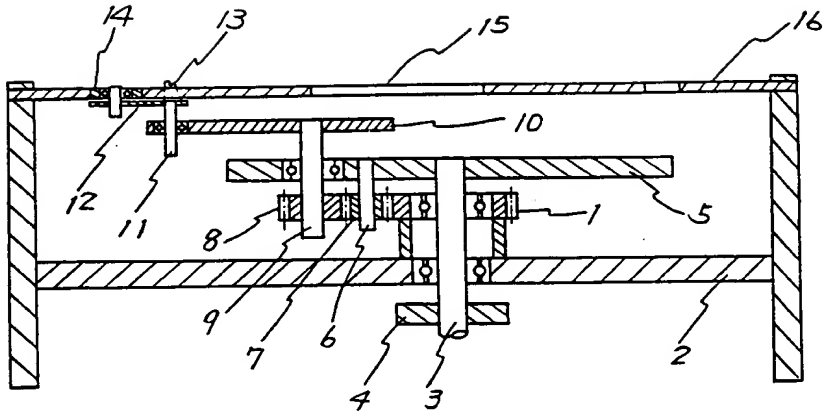
The present invention relates mainly to a thread traverse device in a thread winding machine for textile machinery, however it is not limited to such textile machinery and is also applicable to a mechanism for periodically moving an arbitrary object in a reciprocating motion on a straight line or a curve.

Claim:

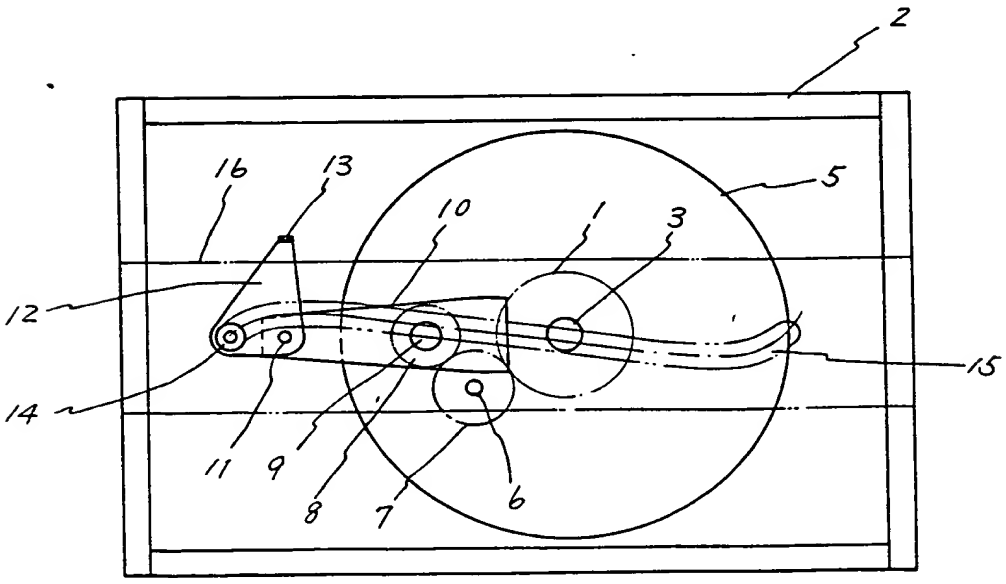
1. A traverse device, characterized in that

- a planetary gear which is driven in rotation through an idle gear is provided around a stationary sun gear;
- a shaft of rotation for said planetary gear is pivotably supported by a plate of revolution fixed to a shaft of revolution concentric with the stationary sun gear;
- a cam arm is secured to a cam shaft pivotably supported by a rotating arm fixed to said shaft of rotation;
- a cam roller and a thread guide are attached to said cam arm;
- said cam roller is fitted in a corrected cam groove provided in a guide plate; and
- said stationary sun gear and said planetary gear have a gear ratio of 2:1, while the distance between the shaft of revolution and the shaft of rotation and the distance between the shaft of rotation and the cam shaft are made equal to each other.

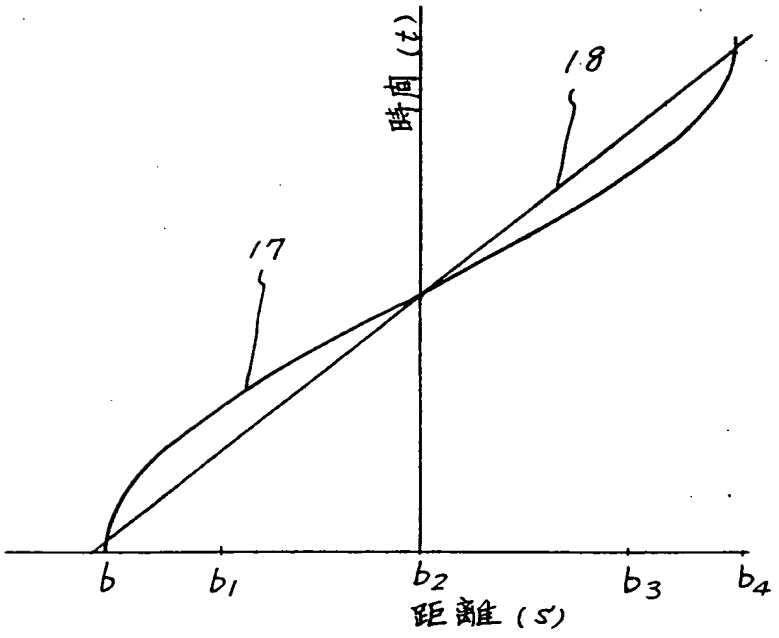
第1図



第2図



才3図



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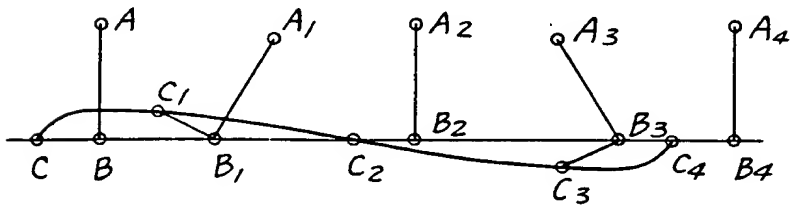

PROPOSED DRAWING CORRECTION
FOR APPROVAL BY THE EXAMINER

Ser. No. 07/
Examiner: A
Group: 2405

approved
KDH 2/7/94

Fig. 3 (PRIOR ART)

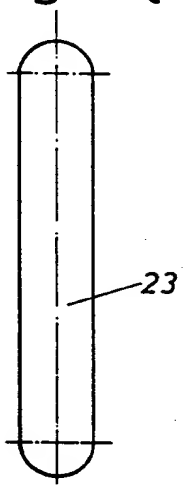

Fig. 4 (PRIOR ART)

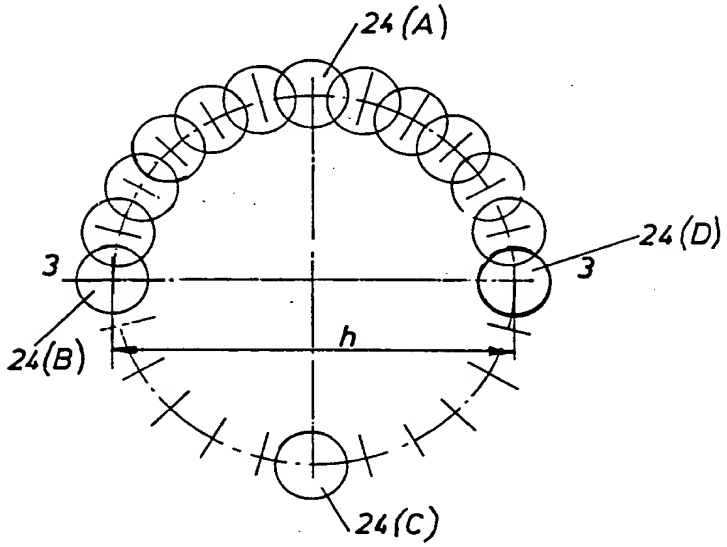

Fig. 5 (PRIOR ART)